Lorraine A Ross
2642 Tifton St S
Gulfport, FL 3711
727-510-1941
Intech@tampabay.rr.com

February 23, 2012

Florida Building Commission
c/o Paula Ford, Agency Clerk
DBPR
2555 Shumard Oak Drive
Tallahassee, FL 32399-2100

DS 2012-020

RE: Petition for a Declaratory Statement from the Florida Building Commission Regarding Discrepancy in Insulation Values for Mass Walls in the Florida Building Code, Energy Conservation

In this matter, I am representing The Dow Chemical Company, which offers insulation products in the State of Florida. With the March 15, 2012 implementation date of the *2010 Florida Building Code, Energy Conservation*, Dow is seeking clarification of required insulation levels in Florida Energy Code Chapter 4 which addresses energy efficiency provisions for residential construction.

This declaratory statement requests recognition of a significant error in Table 402.1.1.3 mass wall insulation requirements that, if left uncorrected, results in less efficient homes than if any other prescriptive compliance path is taken.

Question 1:
Are the *U*-values for mass walls incorrect as listed in Table 402.1.1.3 and its applicable footnote?

Background:

Section 402.1 applies to the prescriptive path and contains 3 choices, two of which are discussed here:

402.1 General (Prescriptive).

402.1.1 Component, insulation and fenestration criteria. The *building thermal envelope* and air distribution system shall meet the requirements of Table 402.1.1

402.1.1.1 *R*-value computation. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

TABLE 402.1.1
COMPONENT EFFICIENCIES REQUIRED[a,l]

% Glazing[c]	Fenestration U-Factor[b]	Sky-light[b] U-Factor	Glazed Fenes-tration SHGC[b,e]	Ceiling R-value	Roof Reflectance Tested per S. 405.6.2	Wood Frame Wall R-value	Mass Wall R-value[i]	Floor R-value/ Slab R-value[d]	Door U-Factor	Ducts: R-value/ Location[k]	Air Handler Location[k]	Air Leakage Tested per S. 403.2.2.1
20%	0 65[j]	0 75	0 30	30	0 25	13	6 / 7 8	13/0	0 65	R-6/ Conditioned	Conditioned	Qn=0 03

For SI: 1 foot = 304 8 mm

a *R*-values are minimums *U*-factors and SHGC are maximums R-19 batts compressed into a nominal 2 × 6 framing cavity such that the *R*-value is reduced by R-1 or more shall be marked with the compressed batt *R*-value in addition to the full thickness *R*-value

b. The fenestration *U*-factor column excludes skylights The SHGC column applies to all glazed fenestration.

c. Percent glazing shown shall be the maximum glazing allowed for compliance by Section 402. Percent glazing area shall be measured in window to floor area and shall include skylight area.

d. R-5 shall be the required slab edge *R*-values for heated slabs only,insulation depth shall be the depth of the footing or 2 feet, whichever is less. No insulation is required for unheated slabs, basement walls or crawl space walls.

e Reserved

f Reserved

g. Reserved.

h. Reserved.

i. The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

j. For impact rated fenestration complying with Section R301.2 1 2 of the *Florida Building Code, Residential* or Section 1609.1.2 of the *Florida Building Code, Building* the maximum *U*-factor shall be 0 75.

k Conditioned= entire distribution system located inside both the thermal and air barrier of the home. Unconditioned = any portion located in unconditioned space.

l Limitations to compliance by Section 402 found in Section 402.2 shall be met

Analysis:

Insulation (Table 402.1.1) –for mass walls, R-value of 6 when the insulation is on the exterior of the wall and R-value 7.8 when more than half the insulation is on the interior of the mass wall.

402.1.1.2. *U*-factor alternative. An assembly with a *U*-factor equal to or less than that specified in Table 402.1.1.3 shall be permitted as an alternative to the corresponding component *R*-value in Table 402.1.1. All other prescriptive criteria of Table 402.1.1, the prescriptive criteria in Section 402.1.2.4 and footnotes to Table 402.1.1.3 shall be met.

TABLE 402.1.1.3
EQUIVALENT U-FACTORS[a,f,g]

Fenestration U-Factor[e]	Skylight U-Factor	Ceiling U-Factor[h]	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor[d]	Crawl Space Wall U-Factor[c]
0 65	0.75	0 035	0.082	0.124	0 064	0 360	0 477

a. Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.

b. When more than half the insulation is on the interior, the mass wall *U*-factors shall be a maximum of 0.165.

c. Basement wall *U*-factor of 0.360

d. Foundation *U*-factor requirements shown in Table 402.1.1.3 include wall construction and interior air films but exclude soil conductivity and exterior air films. *U*-factors for determining code compliance in accordance with Section 402.1.1.3 (total UA alternative) shall be modified to include soil conductivity and exterior air films.

e. Window to floor area, including skylights, shall not exceed 20 percent. See Section 402.1.2.3.

f. Limitations to compliance by Section 402 found in Section 402.1.2 shall be met.

g. Ducts and air handlers shall be located inside both the thermal and air barrier of the home. Air leakage shall be no more than Qn=0.03 when tested per Section 403.2.2.1.

h. Roof reflectance shall be no more than 0.25 in accordance with testing to Section 405 5.5.2.

Analysis:

Equivalent *U*-factor (Table 402.1.1.3) – for mass walls, *U*-factor in the table is 0.124, with a footnote that states that where more than half the insulation is on the interior, the mass *U*-factor is a maximum of 0.165. The corresponding R-values for these *U*-factors are an R-value of 8 (*U*-factor of 0.124) for the exterior and 6 (*U*-factor of 0.165) for the interior.

The Problem:

There is an inherent conflict in thermal performance between the two tables:

Mass Walls – Insulation Levels	**R-value if insulation on exterior**	**R-value if half insulation in on interior**
Table 402.1.1	6	7.8
Table 402.1.1.3 (converting *U*-factor to R-value*)	8	6

* the lower the U-factor, the higher the R-value

Building science and, as stated in the *2009 International Energy Conservation Code,* dictate that placing insulation on the exterior of mass walls in the Florida climate is more efficient due to the mass effect. Therefore the R-values cited in Table 402.1.1 of R6 for insulation placed on the exterior side of the wall and R7.8 when more than half the insulation is on the interior side of the wall is correct.

Table 402.1.1.3 contains an error that resulted from "Comment after glitch", when one word in footnote b was changed - from "exterior" to "interior". *This results in insulation values that are opposite to those in Table 402.1.1.*

> "b. When more than half the insulation is on the ~~exterior~~ interior, the mass wall *U*-factors shall be a maximum of 0.165. ~~0.17 in Zone 1, 0.14 in Zone 2, 0.12 in Zone 3, 0.10 in Zone 4 except Marine, and the same as the frame wall *U*-factor in Marine Zone 4 and Zones 5 through 8~~ [COMMENT AFTER GLITCH]"

This one word change in Footnote b of Table 402.1.1.3 results in a less efficient mass wall than is required. This means that when insulation is added to the interior of a mass wall it needs only to comply with the equivalent of an R6 not the intended R7.8 equivalent. This error causes over a ***20% deficiency*** in thermal performance for mass walls if the *U*-factor alternative compliance path is chosen. Furthermore, we are concerned that these erroneous values are included in the software used to demonstrate compliance with the *Florida Building Code, Energy Conservation.*

Question:

Are the *U*-values for mass walls incorrect as listed in the *2010 Florida Building Code, Energy Conservation*, Table 402.1.1.3 and its applicable footnote? Please clarify.

Sincerely,

Lorraine A Ross

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CC: Mo Madani, CBO, FBC Technical Unit Manager